ORDER

6110.4B

PROJECT IMPLEMENTATION PLAN FOR THE TRAFFIC MANAGEMENT SYSTEM (TMS)

November 25, 1992

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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Initiated By: ANA-130

RECORD OF CHANGES

DIRECTIVE NO. 6110.4B

CHANGE TO BASIC	SUPPLEMENT			OPTIONAL	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL

FOREWORD

This order directs affected organizations to take the action necessary to implement the Traffic Management System (TMS) functions with related software, hardware, and communications. It is modified to identify activities and schedules required to accomplish Phase II, Stage 3 of this implementation. Implementation of TMS enhancements is part of the Capital Investment Plan Project 21-06, Traffic Management System. Management responsibility for this project has been assigned to the Program Manager for En Route Automation/TMS, ANA-300, through ANA-130. Support and cooperation by other organizations is essential for successful implementation of this project.

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CHAPTER 1. GENERAL

1 PURPOSE. This order identifies activities and schedules required to implement Phase II of the Traffic Management System (TMS). This includes the installation of Terminal Radar Approach Control (TRACON) workstations and associated hardware' for the Aircraft Situation Display (ASD) and Monitor Alert (MA), initial Automated Demand Resolution (ADR) software integration, color weather displays, metering list displays (MLD), and future departure sequencing equipment. The leased Full Duplex Interim Communications Network (FDICN) and associated equipment is also covered.

2 DISTRIBUTION. This order is distributed to branch level in the office of the Program Director for Automation, Air Traffic System Management, Air Traffic Plans and Requirements, NAS Transition and Implementation Service; Systems Maintenance Services; to branch level in the regional Airway Facilities and Air Traffic divisions; to division level at the Mike Monroney Aeronautical Center and FAA Technical Center; and limited distribution to the Airway Facilities and Air Traffic field offices.

3 CANCELLATION. Order 6110.4A, Project Implementation Plan for the Traffic Management System, dated November 2, 1989, is canceled.

4. DEFINITIONS. Definitions and acronyms used herein are covered in detail in appendix 1.

5. EXPLANATION OF CHANGE. This order is amended to include TMS Phase II, Stage 3 activities and products deliverable. Information pertaining to the interim communications and deployment was moved from an appendix into applicable areas and reflects current status of the deployment. Specifications for all hardware components have been moved from the body of the order to an appendix. Specific information on the Departure Sequencing Program (DSP) will be included in future revisions of this order pending decisions on the direction of the system. Additional corrections and editorial changes have been made throughout the document.

6 AUTHORITY TO CHANGE THIS ORDER. The Program Manager for En Route Automation/TMS has the authority to issue changes to this order which do not affect policy, delegate authority, or assign responsibility.

7-19. RESERVED.

CHAPTER 2. PROJECT OVERVIEW

20 SYNOPSIS. The TMS Phase II enhancements being implemented per this order will provide the Air Traffic Control Systems Command Center (ATCSCC), Traffic Management Units (TMU), selected Air Traffic Control Towers (ATCT) and TRACON facilities with an interim capability to manage the demand on the National Airspace System (NAS) until other systems, specifically designed to manage the predicted demand, can be implemented. Information contained in this document reflects the status and planning as of the publication date. This order covers the implementation of TMS workstations in ARTCC's and TRACON's, MLD, DSP and TMS workstation software enhancements, color weather displays, ASD, MA and initial ADR functions, incorporation of Central Flow Control Computer (CFCC) and Interfacility Flow Control Network (IFCN) functionality into the Enhanced Traffic Management System (ETMS) and completion of the FDICN. ETMS was developed by Volpe National Transportation Systems Center (VNTSC) as a subset of TMS. Changes to the Project Implementation Plan (PIP) will be made as management decisions and hardware or software modifications occur. Implementation requirements for the departure sequencing program will be addressed in future iterations of this order as requirements are more fully developed and defined. Revisions to the implementation plan are scheduled to be released throughout fiscal year 1992.

21. PURPOSE. TMS workstations in each Air Route Traffic Control Center (ARTCC) and TRACON, connected in a local area network (LAN), provide the means for air traffic control (ATC) to anticipate delays and smooth the flow of aircraft through the NAS. The objective is to meet the air traffic demand efficiently, safely, and economically through equitable and efficient management of airspace and ATC resources.

a. TMS flow management automation currently consists of the CFCC, the IFCN, the FDICN, the Enhanced Traffic Management Computer Complex (ETMCC) and Traffic Management Workstations (TMW). The CFCC processes flight data from the 20 ARTCC's and Anchorage (ZAN) to maintain a data base of current and planned demand on the NAS. Simulations of projected demand and the effect of implementing specific flow management strategies are also performed by the CFCC. The IFCN and the FDICN provide the communications between the TMS components. The ETMCC processes flight data from the 20 ARTCC's, maintains a data base of current and planned demand on the NAS, generates the ASD and MA information for display on the TMW's and transmits the information back to the 20 ARTCC's, and selected TRACON's. The TMW's provide the interface between traffic management

specialists and the TMS. The TMW also provides the interface to MLD, DSP, and collocated NAS En Route Stage-A (HOST) systems. Metering lists currently displayed on the Plan View Display (PVD) will be displayed on the MLD's. The HOST software necessary to transfer MLD data to the TMW will be included in release A4e0.3. DSP functions will be integrated with with other metering functions, the Arrival Sequencing Program (ASP) and-En Route Spacing Program (ESP). A prototype will be implemented in the Los Angeles basin in 1993 to validate the DSP functions. The production version of DSP will be implemented nationally between 1996 and 1998.

b. Workstations installed at selected TRACON's will be used by Traffic Management Coordinators at the TRACON's to establish an automated interface with the controlling ARTCC TMU. A TMU laboratory has been established at the FAA Technical Center to be used for software development and testing. Workstations and associated equipment have been installed at the FAA Academy to support TMS training requirements.

22. HISTORY. Capital Investment Plan (CIP) Project 21-06, Traffic Management System and Project 61-06 upgrade the present flow control system to an integrated TMS which operates at the national level through the ATCSCC at FAA headquarters. Operation at the local level is through TMU's in each ARTCC and designated TRACON's. The upgrading of the TMS improves air traffic system efficiency, minimizes delays, expands services, and is more responsive to user requirements. TMS functions include: Central Altitude Reservation Function (CARF); Airport Reservation Function (ARF); Emergency Operations Facility (EOF); Central Flow Weather Service Unit (CFWSU); various flow management programs with integrated En Route Metering (ERM) functions, such as the DSP, ESP, and the ASP; and the hardware and software necessary to support each of these programs. Continuing Phase II enhancement activities are focused on replacing the CFCC, implementing the MA functions in all en route centers, implementing ASD and MA in selected TRACON's, implementing MLD devices in all en route centers, implementing DSP in selected ATCT's. These enhancements are described in FAA-OR-2788B, System Description of the Traffic Management System Phase II Enhancements.

23.-29. RESERVED.

CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION.

a. Existing System. The goal of the TMS is to provide the NAS with an orderly flow of air traffic that will ensure aircraft movement through the system in a safe environment with minimum delay. Traffic management functions are shared among the ATCSCC, the ARTCC's and selected TRACON's and ATCT's. Traffic management specialists, meteorologists, and automation specialists use computers, weather radar displays, and high speed communications links to provide nationwide monitoring, management, and analysis of air traffic flow. The TMS performs data collection and monitoring, analysis and forecasting, information distribution, display and reporting. Figure 3-1 shows a functional diagram of the TMS system. The current TMS includes the following components:

(1) The Traffic Management Computer Complex (TMCC). The TMCC is located at the FAA Technical Center (ACT) and provides automation support to the TMS. The TMCC includes the following:

(a) CFCC. The CFCC processes the airline schedule flight data from the Official Airline Guide (OAG) and real-time flight data from the 20 CONUS ARTCC's to build and maintain the TMS data base. The ATCSCC and the TMU's use the CFCC data base to determine the demand on the air space system.

(b) IFCN. The IFCN provides communications for components of the TMS. The IFCN interfaces with the National Airspace Data Interchange Network (NADIN), Aeronautical Radio, Inc. (ARINC), the HOST, and other NAS users. The functions that are currently being performed by the IFCN will be re-hosted in the ETMS.

(2) The Enhanced Traffic Management Computer Complex (ETMCC). The ETMCC is located at the VNTSC. The ETMCC is a distributed processing system comprised of several microcomputers. The ETMCC provides the following functions:

(a) ASD. The ASD provides the capability for near real time display of position and track history of all instrument flight rules (IFR) aircraft that are being tracked in the NAS en route environment. ASD provides multiple methods to highlight and display selected sets of aircraft.

(b) MA. The MA provides the capability for dynamic monitoring of the capacity and demand of airspace elements (sectors, fixes, airports). When the demand exceeds the capacity, MA generates an alert to the traffic management specialist.

(c) Communication. The FDICN provides for satellite communication between the ETMCC and the ATCSCC, ARTCC's, and selected TRACON's. The point-to-point portion of the system is a full duplex, full period 56 Kbps per channel communications network connecting a single hub, located at the Transportation System Center (TSC), Cambridge, MA, and field locations within the United States, consisting of 21 ARTCC's, selected TRACON's, ATCSCC, the FAA Academy and the FAA Technical Center (TMU LAB). The traffic management and data base functions that currently reside at the TMCC will be re-hosted in the ETMCC.

(3) Traffic Management Workstation (TMW). The TMW's in the TMU's provide the user interface for the traffic management specialists to communicate with components of the TMS. The TMW serves as the primary interface between national and local flow management personnel. At the national level, the TMW is used by ATCSCC specialists to monitor and manage traffic flow within the NAS and to communicate real-time information to NAS users. At the local level, the TMW is used to manage the traffic flow within the facilities airspace, to coordinate traffic management programs with the ATCSCC and adjacent facilities, and to communicate real-time information to NAS users.

(4) Departure Sequencing Program (DSP). The DSP is not currently an operational system.

(5) Metering List Display (MLD). Metering list data is currently displayed on designated (PVD) devices in the TMU.

(6) Color Weather Displays. Weather displays provide the capability to monitor weather systems and their impact on air traffic. Further information on weather displays can be found in Order 6560.25, Project Implementation Plan for The Meteorologist Weather Processor.

(7) Fileservers. The fileservers provide the communications interface via the FDICN between the ETMCC and the remote sites. The fileservers also store and maintain the dynamic (24 hour) flight record data base at each remote site.

b. Software Enhancements.

(1) The Traffic Management Computer Complex (TMCC). The TMCC will not be enhanced. Those functions currently performed at the TMCC will be implemented in the ETMCC and the TMCC will be decommissioned.

(2) The Enhanced Traffic Management Computer Complex (ETMCC). The ETMCC will be enhanced as follows:

(a) Improve the accuracy of data displayed for ASD.

(b) Improve the monitoring and predictive capability of Monitor Alert.

(c) Implement functions currently performed by the TMCC computers (PDP 1144 and IBM 4341).

(d) Provide data recording and analysis functions.

(e) Implement ADR. ADR will provide the capability to analyze traffic demand conditions automatically and provide traffic management specialists with a list of alternative flow strategies that will resolve the excess demand situation. The ADR is currently in the research and development phase.

(f) Provide graphical weather data displayed on the ASDE.

(3) Traffic Management Workstation (TMW).

(a) Integrate the existing Flow and ETMS software into a single user interface.

(b) Provide MLD capability.

(4) Departure Sequencing Program (DSP). The DSP will provide the capability to coordinate the release of departures from multiple airports to produce an orderly flow of departure traffic which will converge on common departure fixes. DSP functions will be integrated with the NAS en route metering functions: the ASP and the ESP.

(5) Metering List Display (MLD). The MLD will provide the capability to transfer metering data from the HOST to a fileserver/workstation in the TMU. This data will be formatted and sent to MLD devices for display. The MLD function will also provide the capability to send metering list data from the ARTCC to its associated TRACON's.

(6) Color Weather Displays. Color weather displays, located in the TMU, will provide weather data to the traffic management specialist. See Order 6560.25 for more details on the weather displays.

(7) Fileservers. An interface will be established between the HOST computer and the TMS fileserver. This interface will be implemented in two phases. The first phase will be a one-way interface from the HOST to a fileserver which will be used to transmit metering data. The second phase will be a two-way interface between the Host and a fileserver. This interface will replace the existing HOST/IFCN interface. DSP data will also be transmitted via this interface.

31. PHYSICAL DESCRIPTION.

a. The Traffic Management Computer Complex (TMCC).

(1) CFCC. The CFCC consists of software and two IBM 4341-P12 processors and associated peripherals which are linked to the remote facilities (ATCSCC, TMU's) through the IFCN via medium speed communication lines.

(2) IFCN. The IFCN consists of two PDP11/44 mini computers connected to a Bytex electronic switching system. The NAS En Route Host at each ARTCC, the LAN in each TMU, and the LAN in the ATCSCC are connected to the IFCN through individual modems. Each modem is connected to an input port on a statistical multiplexor that is connected directly to the Bytex switch. NADIN and ARINC are connected to the IFCN at the Bytech switch through modems.

b. The Enhanced Traffic Management Computer Complex (ETMCC). The ETMCC is the central processing site for the ETMS. It provides two operational strings of computers running in parallel continuously to provide complete system redundancy. Each string is made up of microcomputers in a distributed architecture to preclude a complete system failure. Communication between the ETMCC and remote facilities is provided by satellite and terrestrial data links. Also included in the ETMCC is a research and development (R&D) string of computers for development and testing of new software enhancements. Figure 3-2 provides a diagram of the ETMCC physical layout.

c. The Departure Sequencing Program (DSP). There are no DSP devices in the current TMS.

d Metering List Display (MLD). Metering list data is currently displayed on the PVD in the TMU.

e. Traffic Management Workstation (TMW). The Apollo DN580 workstation includes the Central Processing Unit (CPU) with a 348 megabyte (MB) fixed disk drive, a high resolution color monitor and detachable keyboard. DN580 workstation peripherals include a NEC printer. Figure 3-3 shows a block diagram of a typical TMU.

f Fileserver. The Apollo DN4500 Fileserver includes the CPU with a 689MB fixed disk drive, 16MB of Random Access Memory (RAM), monochrome monitor, and keyboard.

g Color Weather Displays. A description of the color weather displays can be found in Order 6560.25.

32. SYSTEM REQUIREMENTS.

a. Apollo DN580 Workstation power requirements. Each CPU installation requires a dedicated 100-120 volt 20 amp line. The dedicated line must have a separate circuit breaker originating from the critical power panel. A Topaz power filter will be installed between the workstations and the critical bus. The Danford SEU will draw electrical power from the DN580. The printers and Dynatech switch will also have one Topaz power filter installed between them and critical power. The CPU, color monitor, NEC P5XL Printer and Dynatech switch draw AC voltage from the outlets on the TOPAZ power conditioner. If the TOPAZ power conditioner is remotely located from the TMS equipment, twist-lock receptacles and pigtails must be installed. The units are provided with standard power plugs. Complete specifications for each piece of equipment are described in appendix 2.

b Departure Sequencing Equipment. Departure sequencing equipment is to be determined.

c. Color Weather Displays. For information on the color weather displays see Order 6560.25.

d. MLD. MLD equipment is to be determined.

e. DN4500 Fileservers.

(1) Power Requirements. The DN4500 processor and monitor will be powered through the existing Topaz power filter. Complete specifications for the DN4500 Fileserver can be found in appendix 2.

(2) Location. The DN4500 must be placed in the TMU area. It may be mounted vertically or horizontally similar to a desk top personal computer.

33 INTERFACES. Both internal and external interfaces are required to support information gathering, coordination and processing of TMS functions. TMS elements require external interfaces with the HOST, NADIN, ARINC, meteorological data vendors, military and other FAA users. TMS elements require internal interfaces with other TMS components (ATCSCC, ETMCC, TMCC, TMU's, ARTCC's, TRACON's and ATCT's. Figure 3-4 shows required TMS functional interfaces as described by FAA-OR-2783B, System Description of the Traffic Management System Phase II Enhancements.

a. Internal Interfaces.

(1) Interfacility Flow Control Network (IFCN).

(a) Existing. The IFCN provides the communications interface between the ATCSCC and the TMU's. It permits direct dissemination of traffic advisories and controlled departure times (CDT) to the system facilities and NAS users. In addition, the IFCN interfaces with ARINC, NADIN, and dedicated circuits to the HOST computers for flight plan updates from airlines and flight service stations.

(b) Enhancements. None planned.

(2) Full Duplex Interim Communications Network (FDICN).

(a) Existing. The FAA has leased a 56Kbps full duplex interim communications network (FDICN) under a contract with Contel Federal Systems. The FDICN provides a nationwide satellite communications network capable of simultaneous exchange of data from the communications hub at the ETMCC to numerous FAA locations within the United States and Alaska.

(b) Enhancements. The FDICN contract will be extended until the planned FAA Telecommunications Satelite (FAASAT) becomes operational.

b. TMU Interfaces.

(1) Internal. Apollo DN4500 fileservers interface internally with the DN580 workstations currently in place at each ARTCC and Apollo workstations that have been installed at

selected TRACON's. A DN580 has been interfaced with the MLD's that have been installed at each ARTCC.

(2) External. Apollo DN580 workstations are connected via a token ring LAN to the DN4500 Fileserver which acts as the link between the FDICN network and the LAN. In accordance with NAS-MD-880, Interface Control Document (ICD) Traffic Management Workstation (TMW) Facility - NAS Stage A En Route Host Computer System (HCS), a DN580 will be interfaced with the NAS En Route Stage-A computer to receive MLD information at each facility.

c. TMCC TMU/Workstation Lab to NAS En Route Stage-A Interface. The Apollo DN580's and DN4500's located in the TMU Workstation Lab at the TMCC are interfaced externally with the NAS En Route Stage-A processor located at the FAA Technical Center.

d Emergency Operations Facility (EOF). An EOF has been proposed to serve as a backup in the event of an ATCSCC outage. The equipment necessary to interface to the EOF will be addressed when and if the decision is made to complete the facility.

34-39 RESERVED.

FIGURE 3-1. TMS FUNCTIONAL LAYOUT

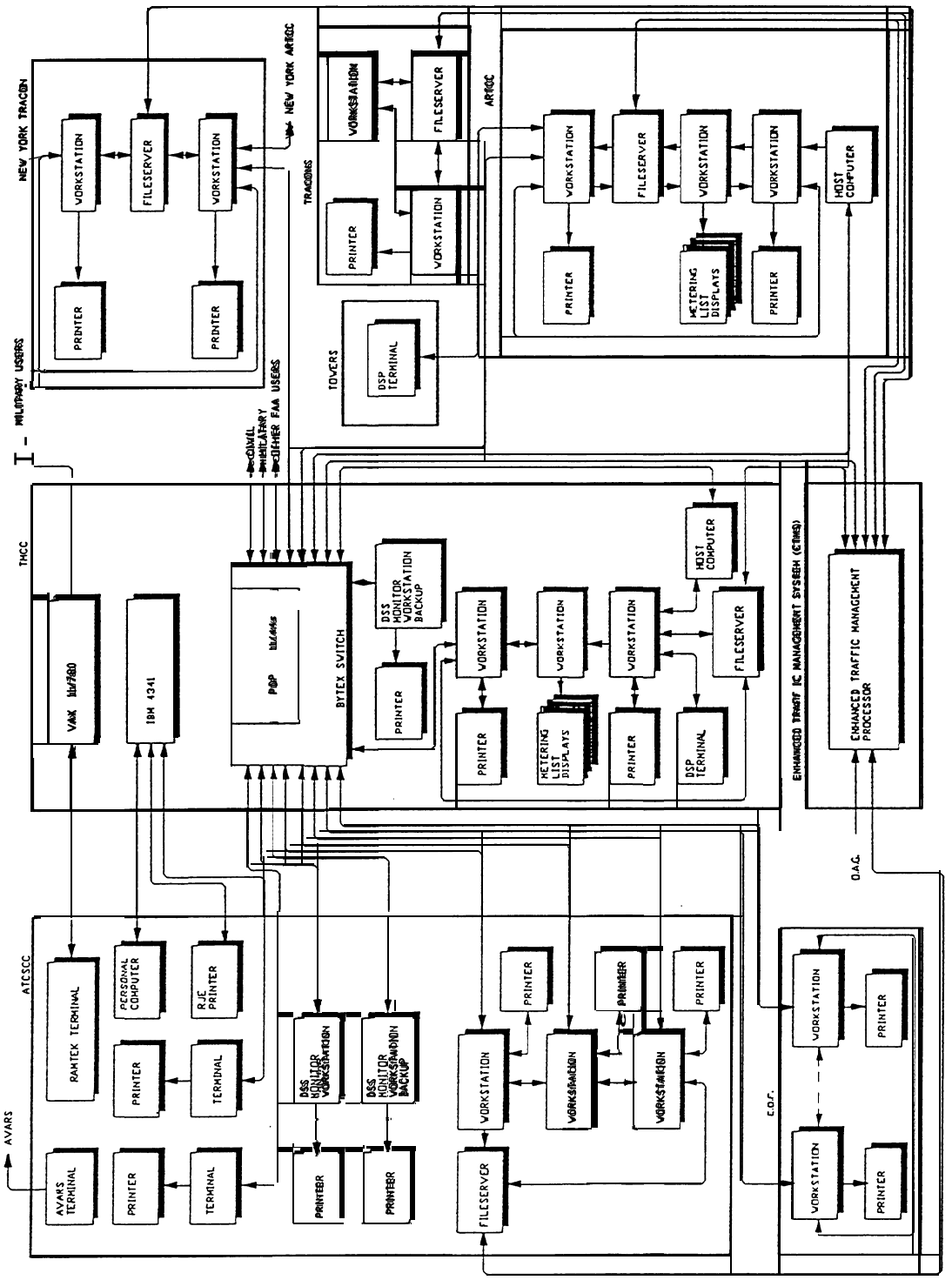


FIGURE 3-2. ETMCC PHYSICAL LAYOUT

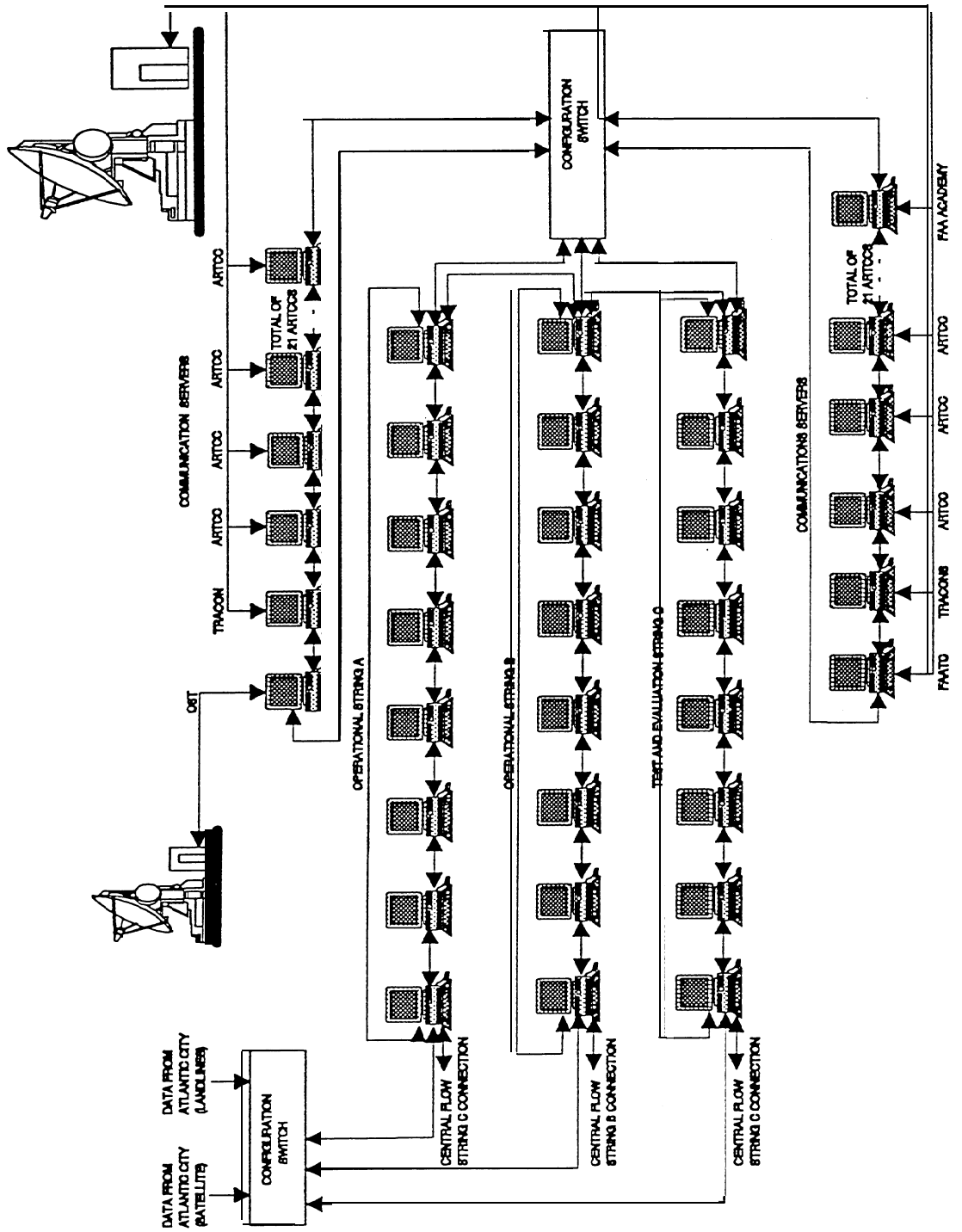


FIGURE 3-3. TYPICAL TMU LAYOUT

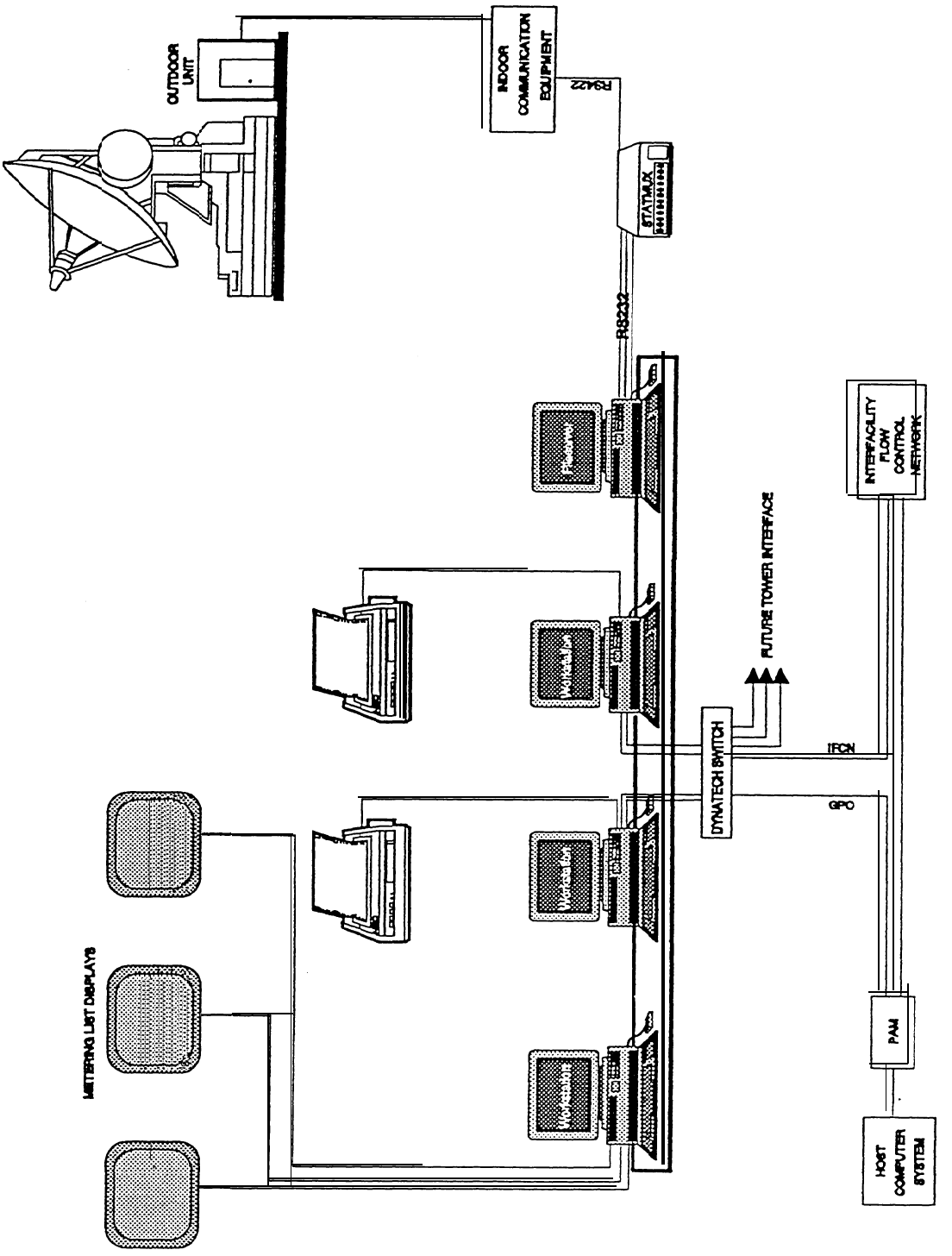
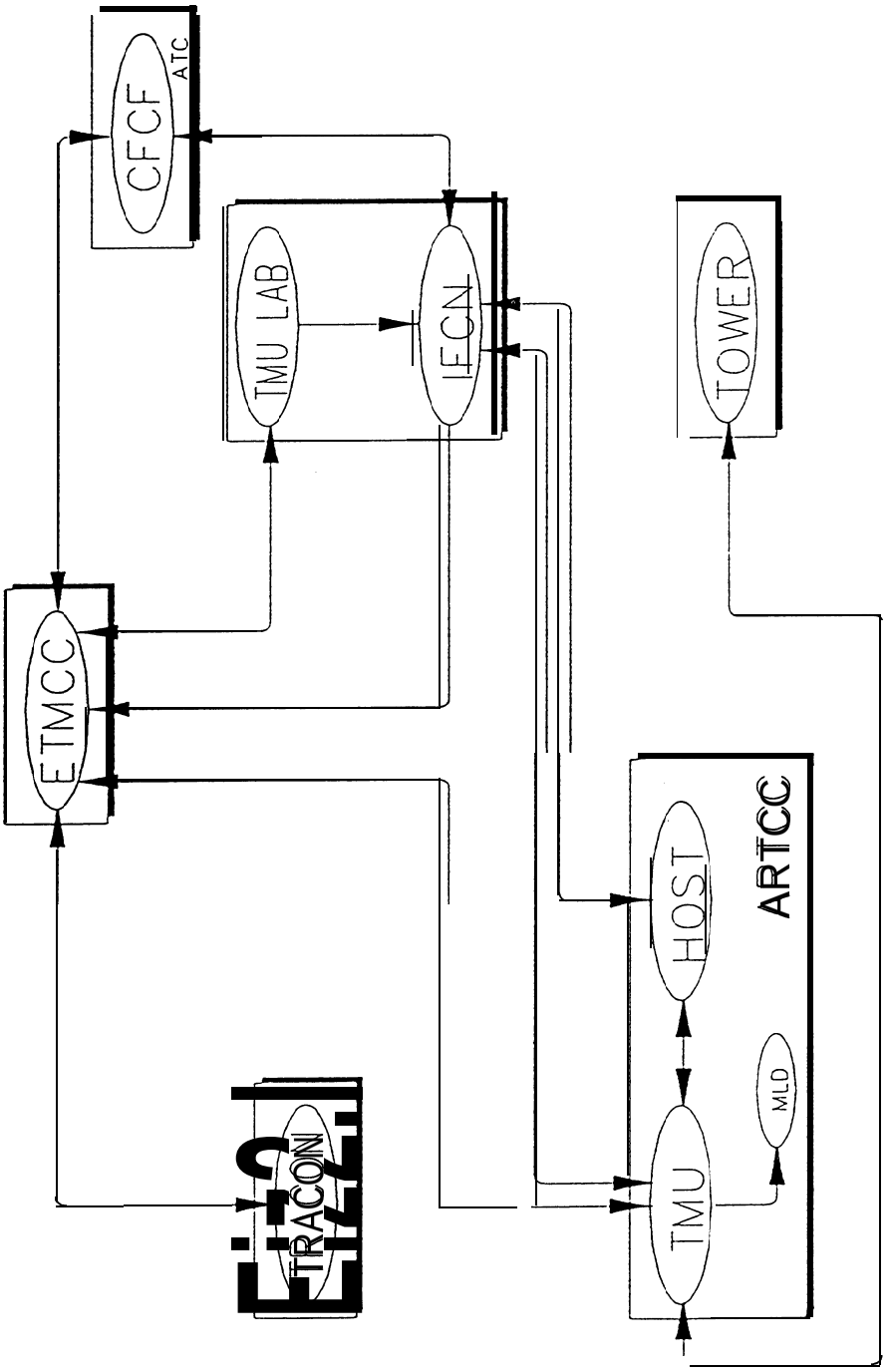


FIGURE 3-4. TMU FUNCTIONAL INTERFACES



CHAPTER 4. PROJECT SCHEDULE AND STATUS

40 PROJECT SCHEDULES AND GENERAL STATUS. Schedules with varying levels of detail will be generated and maintained to plan and monitor the status of this implementation. The master milestone schedule will reflect contractual delivery dates. Site specific implementation schedules will reflect the site planning and preparation activities associated with the specific delivery and installation dates for that site. Summary milestone schedules reflect the top level planning and status for the project.

41 MILESTONE SCHEDULE SUMMARY. The System Engineering and Integration (SEI) contractor develops and maintains summary milestone schedules. The top level status of the implementation activities being performed per this order is reflected in TMS Phase II - Summary Milestone Schedule. The milestone schedule is regularly distributed during the program director's status review. Copies of the schedule can also be obtained upon request from the Program Manager, ANA-300. This schedule covers the Program Director for Automation, ANA-l, and/or the Associate Administrator for NAS Development, AND-l, controlled milestone activities and shows planned completion dates. The schedule is reviewed monthly by the Program Director Status Review (PDSR). Procedures for changing the baseline schedule are described in NAS Project Status and Baseline Schedule Change Control Procedures.

a. Contractor Schedules. Contractors will develop and maintain a master milestone schedule of events planned for accomplishing the work identified in the contract. Each milestone event will be a direct output of lower-level plans and activity networks including subcontractor milestones.

b Installation Site Schedules. Each site will develop and maintain site specific implementation schedules. Regions will provide these schedules to the project office on an as needed basis. When requested, the region will provide a monthly status of the general progress of site preparations towards meeting contractual delivery dates for that site. The region will notify the project manager immediately when it is evident that a site will not be prepared for a contractual delivery.

(1) FAA Technical Center. The FAA Technical Center Engineering, Test and Evaluation Service, ATC Systems Branch, ACN-110, and the National Automation Engineering Field Support Sector, AOS-350, will still perform the functions normally associated with these milestones. Design reviews reflect the

culmination of several reviews at a lower level leading to the major milestones.

(2) FAA Academy. The FAA Academy has been provided with workstations, situation displays and associated equipment. The delivery schedule and hardware configuration management plan were published upon completion of procurement planning.

42 INTERDEPENDENCIES AND SEQUENCE. The implementation of the activities as outlined in this order and per the schedules as indicated in paragraphs 40-41 require the successful completion of activities on other CIP projects. These dependencies are as follows:

a. HOST Project. Implementation of departure sequencing software will require data from the NAS En Route Stage-A processor. A patch to the NAS En Route Stage-A software release A3d2.14 was made to permit prototype evaluation of this software. Design of this software has not yet been completed. The impact on the NAS Host software will be more thoroughly discussed when the departure sequencing requirements are completed. Implementation of MLD's requires NAS En Route Stage-A software modifications that will be included in release A4e0.3 of the NAS En Route Stage-A software.

b Data Multiplexing Project. Implementation of the TMU workstation to departure sequencing equipment and TMU workstation to TRACON workstation interfaces require interfacility communication links between TMU's and towers. Interfacility communication requirements will be satisfied by statistical multiplexers, modems, and leased lines provided by the data multiplexing project. Requests for use of the Data Multiplexing Network (DMN) or any change to the existing DMN configuration, must be submitted to ASM-300 for concurrence at least one year prior to TMS system implementation.

43-49. RESERVED.

CHAPTER 5. PROJECT MANAGEMENT

50 PROJECT MANAGEMENT, GENERAL. The Program Manager for En Route Automation/TMS (ANA-300) has overall responsibility for management of the TMS P2E contract and activities outlined in this document. The Associate Program Manager for Engineering (ANE-1), En Route Automation Program, ANA-130, will provide technical management and engineering support for accomplishing management tasks within the guidelines provided by FAA policies, procedures, and directives. A member of this organization is designated TMS project manager and is the single focal point for all project activities. Communications requirements are provided to ASM-310. The equipment is provided by the National Automation Engineering Field Support Division, AOS-300.

a. Contracting Officer (CO). The CO designated by the Office of Acquisition Support, Contracts Division, Automation Services Branch, ASU-350, performs, or delegates the responsibility to perform, the general contract management activities of monitoring contractor schedules, assessing problem reports and solutions, attending meetings, performing quality control/quality assurance surveillance, conducting in-progress reviews and all other activities associated with assuring that the terms of the contract are met. The CO is the only person authorized to make changes that will affect prices, deliverables, or schedules.

b. Contracting Officer's Technical Representative (COTR). The COTR position will be designated by the TMS project manager in ANA-130, and will provide technical guidance and direction to the contractor within the scope of the contract. The COTR will ensure that the contractor has access to technical documentation, appropriate data bases, and sources of information relative to Government Furnished Property (GFP).

c. Regional Project Management. Each region will appoint a TMS regional project manager. The regional project manager will ensure that facilities and engineering work is complete prior to delivery of the TMS equipment. He or she will monitor the installation of the TMS equipment and coordinate requests for contractual or technical support with ANA-130 and/or AOS-450. The regional project manager will arrange for the appointment of the technical onsite representative (TOR) at each ARTCC, TRACON or ATCT.

d. ARTCC, TRACON and ATCT Project Management. The ARTCC and TRACON TOR's will be appointed by the region, and will have overall responsibility for the management of the TMS project within the facility as described in Order 6030.45, Facility

Reference Data File. The TOR in conjunction with the Establishment Engineering Branch shall be responsible for ensuring that the TMS site preparation activities are complete and acceptable before the TMS equipment arrives.

(1) Site Management. The TOR shall be responsible for assisting the contractor in conducting the post contract award site survey, ensuring installation and/or verification of interfacility communications, preparing facility plans and procedures necessary to modify and/or relocate the current TMU work area, coordinating through the regional project manager and ANA-130 any work which must be contracted out, scheduling of personnel necessary to install the system, reporting of problems encountered during the installation, and resolving these problems with the help of the regional project manager, ANA-130, and AOS-350, if required. The TOR must ensure that all TMS hardware has been properly installed, that all installation, integration, and acceptance testing has been completed, and that initial operational capability (IOC) has been achieved.

(2) Operations Management. The TOR must also ensure that all operations and maintenance training has been satisfactorily accomplished, and that operational procedures have been established prior to the Operational Readiness Demonstration (ORD). The duties of the TOR will be completed when the joint acceptance inspection (JAI) has determined that the system may be commissioned.

e. First Test Site Management. The FAA Technical Center will be the site of the first installation. A test representative will be appointed from ACN-110 to serve as the lead for integration testing, and from AOS-350 to serve as lead for shakedown testing. The test representative will coordinate his or her activities with the TMS project manager, ANA-130.

51. CONFIGURATION MANAGEMENT. Configuration Management (CM) shall be performed in accordance with Order 1800.8F, National Airspace System Configuration Management. Configuration items of concern for this implementation are the physical items, interfaces, software, and associated documentation which comprise the TMS baseline. CM discipline shall be applied to all configuration items included in the TMS baseline to ensure compatibility between elements within the TMS, and between the TMS and NAS operational computers. All additions and changes to the TMS baseline shall be proposed in the form of case files, and shall be reviewed for recommended approval or disapproval by the applicable Configuration Control Board (CCB).

a. Acquisition Phase CM. During this phase, the Automation Engineering Division (ANA-l) CCB controls the establishment of and changes to TMS Phase II hardware and applications software baseline. The members and purpose of this CCB are described in the Charter for National Airspace System Automation Configuration Control Board (ANA CCB). The ANA CCB is responsible for ensuring that the functional, performance, and interface requirements allocated to the TMS Phase II hardware and software subsystems are reflected in the baseline, and in any changes to those baselines until product acceptance. The ANA CCB is also responsible for ensuring that baseline documentation is accurate and reflects TMS Phase II operational requirements. Baseline documentation includes specifications and interface control documents (ICD). The ANA CCB retains this CM responsibility until the hardware installation is commissioned at each site and until application software enhancements are accepted by the office of Air Traffic Systems Management, Future Systems, ATM-500. The TMS contractors shall plan, execute, and manage the CM functions associated with the development of TMS Phase II hardware and software enhancements during contract performance, in accordance with the applicable DOD and FAA standards. cited in the Statement of Work. This shall include configuration identification, control, status accounting, and baselining of hardware configuration items (HWCI) and computer software configuration items (CSCI). VNTSC shall plan, execute, and manage the CM functions associated with the development of software enhancements as defined by the task descriptions in the current Project Plan Agreement (PPA). This shall include configuration identification, status accounting, and baseline management of CSCI's.

(1) Transition of Hardware CM. The transition of CM responsibilities associated with TMS Phase II hardware products occur at acceptance by the ANA CCB designated representative. The representatives will evaluate the contractor's delivered, installed, integrated, and tested hardware product. Hardware product acceptance is based on successful ORD of TMS equipment at each site. At product acceptance, the change control functions and CCB records associated with hardware products transition from the ANA CCB to the Maintenance Engineering (ME) joint Configuration Control Decision (CCD).

(2) Transition of Software CM. Acceptance by ATM-500 of application software product is based upon successful completion of shakedown testing at the FAA Technical Center. Upon acceptance, the application software becomes the operational software baseline with CM responsibility transferring to the Automation Software Policy and Planning Division, ATR-200, for those items that impact NAS or the Host, such as MLD and the

departure sequencing program. Post baseline CM includes the software product specification and associated interface control documents. Responsibility for Apollo based software is retained by ATM-500. The change control functions and CCB records, associated with application software products, transition from the ANA CCB to the AT CCB via a joint CCB.

b Operational Support Phase CM. During the operational support phase, CM functions will consist of maintenance and change control management of product baseline.

(1) Operational Hardware CM. The ME CCB assumes baseline and change control management of the TMS hardware configuration items after the last ORD. Hardware product baseline are maintained by Airway Facility (AF) personnel in the field. All proposed changes to the hardware baseline shall be evaluated by AOS-450 and ATM-500 prior to field implementations. The change shall be approved for field implementation via a case file. ATM-500 approval is required since system hardware changes may affect operational software performance.

(2) Operational Software CM. The AT CCB assumes change control management of the TMS Phase II operational software baseline and is responsible for ensuring the integrity of the operational software and required support software post implementation. ATR-200 is responsible for CM of baselined operational software that impacts the Host computer system. ATM-500 retains CM responsibility for all other TMS Phase II software. Post baseline CM includes the software product specification and associated ICD's.

(3) Proposed enhancements to baseline software. ATM-500 will evaluate proposed enhancements to determine the impact on the baseline operational software. ATM-500 shall generate case files to implement any necessary changes to the operational software baseline. AOS-450 shall be consulted for approval of these changes since the changes may impact hardware performance and configuration. ATM-500 will forward approved case files to TSC for action. ATM-500 shall test all operational software enhancements prior to the next release of the functional software baseline to the field. Once released, these enhancements become part of the baseline software with CM responsibility retained by ATM-500.

52 PROJECT CONTACTS. A complete list of the individuals who are directly involved with, and who are responsible for the successful completion of the TMS project is maintained by the program office.

53 PROJECT COORDINATION. ANA-130 has overall responsibility for the development and installation of the TMS enhancement project. ANA-130 has project management responsibility and is the point of contact for all activities related to TMS projects. A copy of all correspondence concerning TMS related activities shall be sent to the TMS project manager at the time of transmittal. Technical direction to the contractor within the scope of the contract will be provided by the Contracting Officer's Technical Representative (COTR). The FAA Technical Center contact points will be the Engineering, Test, and Evaluation Service, Automation Division, ACN-100, for integration testing and AOS-450 for shakedown testing. The contact point for management, control and release of operational software will be ATM-500. Appointed regional project managers and onsite technical representatives will be the contact points for regional and site support activities.

a. Monthly Program Review. The status and progress of project implementation will be reviewed monthly by the project manager. These reviews shall assess the technical and schedule aspects of the program, identify problems and assign actions to supporting organizations to ensure that program objectives are successfully accomplished. The reviews will include representatives of all organizations and appropriate contractors responsible for project implementation. The reviews will be held at FAA headquarters (Washington area).

b Training Documentation. Training documentation developed by both TSC and the TMS P2E Contractor will be provided to ANA-130. ANA-130 will ensure that all training documentation is provided to the Airway Facilities Training Program Division, AHT-400, and the Air Traffic Training Program Division, AHT-500, for review. AHT-400 and AHT-500 are responsible for coordinating this review with AAC-932D and AAC-942A, within the FAA Academy. Comments will be coordinated by AHT-500 and submitted to ANA-130 for transmission to the contracting officer.

54 PROJECT RESPONSIBILITY. The TMS project manager in ANA-130 has the overall responsibility for implementation of the Phase II TMS enhancements.

a. Major organizational responsibilities.

(1) ATM-500. Overall review and approval; ASD and MA field training for TMU personnel; software CM prior to baselining.

(2) ANA-300. Program management for activities described in this order; hardware and software procurement;

hardware CM; initiation of national case file to attach workstations to critical power; documentation.

(3) System Plans and Programs Division, ATR-100. Requirements.

(4) ATR-200. Post baselining; hardware and software acceptance testing.

(5) ACN-100. Engineering; quality assurance; integration and test.

(6) Office of Acquisition Support, Contracts Division, ASU-300. Preparation and negotiation of contract and modifications.

(7) Office of Acquisition Support, Industrial Division, ASU-400. Contract quality assurance monitoring for hardware and software.

(8) Regions. Site CM; site preparation; site survey support; equipment installation support; and site acceptance testing.

(9) AOS-400. Shakedown testing; field support maintenance; operational hardware CM.

(10) Maintenance Operations Division, AOS-200. Space CM; critical power CM.

(11) Telecommunications Management and Operations Division, ASM-300. Communications requirements analysis and engineering.

(12) AOS-450. Second level support source of system information other than program office and vendor.

(13) En Route Systems Engineering Branch, AOS-430. Interfacility communications equipment.

(14) AHT-500. Training and certification.

(15) AHT-400. Personnel and technical training.

(16) ANS-400. National Airspace Integration Logistical Support.

(17) ANS-200. Facilities integration.

(18) ANS-100. NAS transition assessment.

(19) FAA Logistics Center, AAC-400. Initial provisioning and supply support for equipment other than workstations.

(21) FAA Academy, AAC-900. Development and administration of technical training.

(18) TSC. Maintenance of ASD/MA hub software; monitoring of system; action on Program Trouble Reports (PTR); testing of enhancements.

b. Specific Organizational Responsibilities.

(1) Program Manager for En Route Automation/TMS, ANA-300.

(a) Direct, guide, and coordinate overall project activities.

(b) Acquire validated user requirements.

(c) Perform systems engineering and analysis.

(d) Procure hardware and software development contractor.

(e) Maintain master schedule.

(f) Ensure adherence to CIP and availability of funds.

(g) Develop and maintain project implementation plan.

(h) Develop and maintain project master test plan.

(i) Ensure hardware maintenance with in-house resources or with contract resources.

(j) Accept hardware from the contractor.

(k) Develop plan and provide funding to acquire equipment for FAA Academy.

(l) Develop and maintain a program management plan.

(m) Develop and maintain a list of points of contact at each affected region and facility.

(n) Conduct monthly teleconferences with regional and site representatives.

(2) Systems Maintenance Service, AOS-200, ASM-300, AOS-300.

(a) Develop integrated logistics support plan.

(b) Develop AF training requirements and coordinate training.

(c) Manage hardware, space, and critical power, and interfacility communications configuration.

(d) Order communication lines.

(e) Order modems and multiplexers.

(f) Assign specific ports on modems.

(g) Conduct hardware/software shakedown tests at the TMCC.

(3) Air Traffic Management, ATM-530.

(a) Identify operational/functional requirements.

(b) Develop operational cutover and acceptance plans.

(c) Develop and maintain a plan for control of operational software releases.

(d) Support ANA in the acquisition of new hardware and software by participating in system requirements, preliminary design, and critical design reviews and acceptance testing.

(e) Update operational procedures.

(4) FAA Technical Center, ACN-100.

(a) Develop integration test plans and conduct hardware/software integration tests at the TMCC.

(b) Perform site preparations for new hardware for TMU Lab.

(c) Assist ANA in developing project implementation plan.

(d) Appoint independent test manager for Phase II tests.

(e) Monitor software development activities.

(f) Monitor hardware/communications network integration and test.

(5) Air Traffic Training and Certification, AHT-500.

(a) Develop AT training requirements and coordinate training proposal.

(b) Administer attrition technical training on-site as required.

(c) Provide advice and representation on technical training programs.

(d) Administer the technical training programs and provide advice and representation on these programs.

(e) Ensure that project technical training requirements are identified in a timely manner and that necessary training is developed and/or made available.

(f) Review requirement for training equipment.

(6) FAA Academy, AAC-900.

(a) Develop and conduct overview briefings to introduce contractor, provided training programs associated with the new TMS.

(b) Develop and conduct attrition training programs for TMS equipment operations, administration, maintenance and software use.

(7) Regions.

(a) Conduct initial site survey and support contractor's site survey to identify equipment location and cable run paths.

(b) Generate case files to establish configuration baseline for each site which satisfies floor space and power requirements.

(c) Perform site preparation including site engineering and planning, update facility documentation, drill holes through operations floor and walls for cable routing, and install power and cables to support TMS workstations and peripherals.

(d) Ensure communications links are established prior to contractor installation. All TSR's will be at least 30 working days prior to equipment delivery to allow for testing and acceptance.

(e) Prepare facility plans and procedures necessary to modify and/or relocate the current TMU work area.

(f) Review site acceptance test procedures, site survey reports, and installation plans prior to installation and ensure that all FAA site preparation activities are completed.

(g) Support contractor during site installation. This includes providing ancillary site equipment needed to complete installation, such as ladders, water and electrical connections, etc., escorting the contractor to and from the installation site, and coordinating with contractor personnel during installation and integration activities.

(h) Ensure contractual compliance with installation plan and site test procedures and that all variances have been documented.

(i) Perform Joint Acceptance Inspection (JAI).

(8) TMS P2E Contractor.

(a) Perform system requirements analysis.

(b) Conduct design reviews.

(c) Procure and install TMS workstations, departure sequencing terminals, MLDs, and peripherals.

(d) Develop software as defined in contract.

(e) Prepare site installation plans.

(f) Conduct checkout and acceptance of newly installed hardware in the ATCSCC, TMU's, towers, TRACON's, and the FAA Technical Center.

(h) Conduct training in accordance with contract provisions.

55. PROJECT MANAGERIAL COMMUNICATIONS. In addition to the monthly program review, status and technical interchange meetings will be called as appropriate to focus on specific project topics and issues. All organizations supporting this project shall bring to the project manager's attention any concerns and issues which, if left unresolved, could adversely affect the project's success. The project manager shall inform affected organizations of any changes, issues, or problems regarding project status. Organizations are encouraged to use facsimile transmissions for communications.

56. IMPLEMENTATION STAFFING. There are no unique or peculiar field staffing requirements associated with the implementation of this project. Offices with assigned responsibilities are expected to accomplish their tasks with existing resources.

57. PLANNING AND REPORTS. Successful implementation of the hardware and software included in this order will require the preparation and approval of several documents by the FAA and the contractor. Applicable plans and reports required for implementation are listed in appendix 3.

58. APPLICABLE DOCUMENTS. This order makes use of information, policy, and directives found in existing FAA documents. These documents are listed in appendix 4 for the convenience of the user and are referred to in the appropriate paragraphs within this order.

59. RESERVED.

CHAPTER 6. PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL. Funding to the end of FY-1992 has been approved. Specific funding information beyond what is publicly available is classified as privileged information and cannot be disclosed outside of the FAA except on a need-to-know basis. The program office will support site preparation for each Stage 3 activity.

61.-69. RESERVED.

CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS.

a. Deployment of TMS Phase II hardware enhancements. Deployment of the TMS system will be accomplished after testing and acceptance by ACN-110, ATM-530, and AOS-300, and after a Deployment Readiness Review (DRR) has been conducted and all deployment critical checklist items have been satisfactorily resolved. The applicability of each checklist item was determined at TMS DRR Team Meeting and the status of each item is reviewed on a monthly basis. AAF-11 will publish a DRR checklist and summary report on a monthly basis. See appendix 6 for DRR Deployment Schedule.

(1) Relocate Apollo DN300 workstations currently placed on the control room floor within the ARTCC's, and reinstall and integrate them at positions in administrative areas to be used for analysis tasks. (Completed in Stage-l)

(2) Remove Apollo DN300 workstations from the ATCSCC and New York TRACON. (Completed in Stage-l)

(3) Install and integrate DN580 workstations at the ATCCC, TMU's at ARTCC's and TMCC. (Completed in Stage-l)

(4) Install ASD and MA in ATCSCC. (Completed)

(5) Install ASD and MA in 25 selected TRACON's. (Stage-3)

(6) Install and integrate FDICN at ARTCC's/TRACON's.

(7) Install and integrate workstations into the EOF. (Stage-3)

(8) Install and integrate MLD's at each TMU. (Stage-3)

(9) Remove Apollo DN300 workstations and install and integrate replacement color graphics workstations.

(10) Provide additional fileservers for ARTCC TMU's. (Stage 3)

(11) Provide equipment for the Aeronautical Center to support traffic management training. (Completed)

b TMS software deployment. TMS software on the Apollo workstations, shall be implemented, monitored, and controlled by ATM-500. Implementation of TMS software enhancements shall be accomplished in the following manner.

(1) Rehost. The TMS software operating on existing DN300 workstations was rehosted to the DN580 workstations as they were installed. (Completed in Stage-l)

(2) Enhancement Acceptance. Acceptance testing of TMS software is the responsibility of ACN-110, ATM-530, and AOS-300. Software enhancements will be developed by the TMS P2E contractor and TSC. The P2E contractor developed enhancements will be integrated with GFP operational software by TSC and delivered as operational prototypes to ATM-530 for evaluation. ATM-530 will determine if functional and performance requirements have been met and approve installation of the enhanced software in the ATCSCC. Traffic management specialists in the ATCSCC will conduct an operational evaluation of the enhancements. After successfully passing the operational evaluation, the software will be provided to ACN-110 for integration testing in the TMS support facility at the FAA Technical Center. This testing will verify the installation procedures and the performance of the enhanced software in the exact hardware and software configuration operating in the field. Upon successful completion of integration testing, shakedown testing will be performed by ATM-530 and AOS-300 in the TMS support facility. When the software enhancement successfully completes all these tests the software will be approved for field deployment.

(3) Operational Release. ATM-500 shall plan, schedule, and control releases of Apollo resident operational software to the field units. Each software enhancement shall be scheduled for a specific operational release based upon its development and acceptance schedule.

71 SITE PREPARATION. Site preparation shall be in accordance with engineering requirements as defined in the Site Survey Reports and as documented in the Installation Plans, and shall be completed 2 weeks prior to equipment delivery (to match schedules). Generally, site preparation will consist of installation and verification of electrical outlets, identification of cable trays, preparation of cleared installation surface areas, and installation and/or verification of interfacility communications. The region is responsible for preparing facility plans and procedures necessary to modify and/or relocate the current TMU work area to accept the new TMU hardware. Each region is responsible for arranging and/or contracting for modifications to ARTCC or TRACON facilities.

a. Site Surveys. Site surveys shall be conducted jointly by regional AT and AF personnel at each site prior to deployment of equipment, to determine specific equipment locations and positioning to satisfy operational, technical, and security requirements and to define floor space and power requirements. . AF personnel at each site shall generate a local case file to establish a configuration baseline which satisfies floor space and power requirements. The contractor shall perform final site surveys using the results of the initial surveys to finalize details pertaining to equipment locations and interconnecting cables. Requirements for interim relocation of the TMU equipment will be analyzed and incorporated into the final site survey reports. Representatives from the regions, the ARTCC's, the FAA Technical Center, selected TRACON's and the FAA Academy Training Center will assist and support the final survey. Results of the site surveys will be incorporated into Site Survey Reports which shall be prepared by the contractor.

b Site Engineering. Site engineering for site adaptation of facilities and updates to facility specifications, drawings, and instructions shall be the responsibility of the regional AF division.

72 DELIVERY. Hardware and software deliveries are planned as indicated in appendix 5. The contractors will conduct receiving inspection on all equipment deliveries to ensure that all hardware, software, and associated documentation have arrived and are not damaged. Discrepancies should be documented and resolved prior to installation. Deliveries shown to the FAA Technical Center are actually to the TMU Lab, a tenant of the FAA Technical Center,

a. Hardware Delivery. The contractors are responsible for arranging delivery of all required hardware to each site. Each region and center will designate a point of contact and shipping address for equipment delivery. The contractors are responsible for arranging for storage off site, when any equipment is expected to arrive more than one week prior to the arrival of the contractor's installation team. When hardware is delivered, the containers must remain unopened until the installation team arrives.

b Software Delivery When new equipment is delivered, the hardware and appropriate software will be installed by contractor personnel. Appropriate software documentation and backup tapes will be provided by the contractor. Software deliveries that are not associated with equipment installations will be delivered by ATM-530 via tapes for installation by TMU personnel. These

deliveries will include installation instructions and appropriate software documentation.

73 INSTALLATION PLAN. The contractor will develop detailed installation plans for hardware delivered to each ARTCC or TRACON. Plans will also be developed for equipment delivered to the TMCC, the TMS support facility located in the FAA Technical Center, and to the FAA Academy. Representatives from the region and the center who participated in or supported the site survey shall have the opportunity to review the installation plan for their respective sites.

a. Installation Plan Contents. The installation plan (CDRL Item T044) will contain as a minimum:

(1) Site information affecting installation.

(2) Installation drawings.

(3) Electrical and environmental interface definitions.

(4) Installation procedures.

(5) Installation checkout procedures prior to testing.

(6) Coordination plans that will allow for interruptions in ongoing work at the facility.

(7) Identification of the responsibilities and authority of personnel necessary to effect the installation.

(8) Identification of all hardware, software, tools, and other materials required.

(9) Detailed schedule of events and manpower estimates for the installation.

b Site Installation. Site installation activities will be performed by the contractor with support from regional and ARTCC/CNAS sector AF personnel. ANA-130 will contact regional and site representatives to coordinate equipment delivery, installation activities, and effect problem resolution when

necessary. ANA-130 will provide contractor personnel data to onsite security representatives prior to commencement of installation activities. Enhancements to baseline software will be installed by traffic management personnel, under the direction of ATM-500, or by the P2E contractor.

74.-79. RESERVED.

CHAPTER 8. VERIFICATION

80. FACTORY VERIFICATION. Factory acceptance testing at the TMU Lab shall be performed for hardware and software by the contractor in accordance with the provisions of Defense System Software Development, DOD-STD-2167A (for software acceptance), and of Order 1810.4B, NAS Test and Evaluation Program (for hardware acceptance).

a. Factory Acceptance Testing. Factory acceptance testing of both hardware and software will accomplish the following:

(1) Demonstrate that hardware performs to vendor specifications.

(2) Demonstrate that HWCI's have been functionally integrated internally and externally.

(3) Verify fulfillment of contractually specified requirements.

(4) Identify deficiencies in functional specifications.

(5) Determine the need for requirements modification(s).

(6) Assess compatibility with the NAS.

(7) Verify acceptability of associated deliverable documentation, including training and logistics support documents.

(8) Provide data for refining training requirements.

b Software Factory Acceptance Testing. Factory acceptance testing of contractor-enhanced Apollo software shall consist of formal CSCI testing followed by, first, a Functional Configuration Audit (FCA) and, then, a Physical Configuration Audit (PCA) of CSCI test results and documentation.

(1) CSCI testing.

(a) Consists of tests of new software enhancements integrated with the CFP software baseline.

(b) Shall be performed first in a stand-alone mode then in an integrated mode within the TMS Lab System (interfaces, applications software etc.).

(c) Shall be performed by the contractor and witnessed by the FAA at the TMU Lab.

c. Hardware Factory Acceptance Testing. Installation, integration, and factory acceptance testing of hardware items shall be performed by the contractor at the TMU Lab and will be witnessed by the FAA. The contractor's factory acceptance test shall be described in test procedures (CDRL Item T042), and the associated results documented in test reports (CDRL Item T043). It shall consist primarily of demonstrating that the performance of stand-alone and integrated hardware items fulfills specified performance and functional requirements. The following will be tested during the appropriate delivery stage:

(1) Stand-alone functional performance of workstation, departure sequencing equipment and MLD.

(2) Integrated functional performance of workstations and associated peripheral equipment.

(3) Integrated functional performance of the interface between the MLD's and the workstation.

(4) Integrated functional performance of the interface between the departure sequencing equipment and the workstation.

(5) Integrated functional performance of the interface between the NAS Stage A HOST computer system and TMU workstation.

(6) Integrated functional performance of the LAN, including both internal (among workstations) and external interfaces.

(7) Stand-alone functional performance of color workstations using GFP operational software.

(8) Integrated functional performance of GFP operational software on workstations in a LAN.

81 CHECKOUT. Testing of TMS workstations, metering list displays, departure sequencing display devices and software enhancements shall adhere to the guidelines established in Order 1810.4 and in NAS-MD-110, ADL Test and Evaluation (T&E) Terms and Definitions for the NAS. Checkout and verification of equipment and software performance shall be in accordance with technical requirements as prescribed by AOS-300 and ATM-500.

82 CONTRACTOR INTEGRATION TESTING. Contractor integration testing is conducted in conjunction with the factory acceptance tests in the TMU lab at the FAA Technical Center. The TMS P2E contractor will prepare a Master Test Plan (CDRL Item T041) which describes the factory acceptance tests, and the plan for supporting the FAA's integration, acceptance and shakedown tests at the TMU Lab, and site acceptance tests in the regions. Test objectives and procedures shall be described in Test Procedures (CDRL Item T042) and test results documented in Test Reports (CDRL Item T043). The TMS P2E contractor will conduct testing in accordance with these plans and procedures during each stage of the TMS Phase II project.

83. FAA INTEGRATION TESTING. FAA conducted testing with contractor assistance follows contractor testing at the TMU Lab to make certain that all hardware and software functions have been successfully integrated, contractual requirements have been met, and to determine the operational effectiveness and suitability of the new systems. FAA testing will be conducted in two phases, hardware/software integration testing and shakedown testing. The ACN-110 Program Manager for TMS will develop master test plans that define the overall test philosophy, and describe the contractor and FAA tests to be conducted for acceptance of the TMS Phase II hardware and software enhancements.

a. Hardware and Software Integration Testing. ACN-100 is responsible for the overall conduct of integration testing of Apollo hardware and software when the system is installed. The contractor will prepare the test plan and procedures for these tests with final approval from ACN-100. The objectives of the integration tests are as follows:

(1) Verify functional performance of integrated HWCI's and associated peripherals and equipment.

(2) Verify functional and operational performance of the LAN, both internal (among workstations) and external interfaces to departure sequencing and MLD's.

(3) Verify functional and operational performance of contractor-rehosted GFP operational software on the stand-alone color workstation.

(4) Verify that all requirements specified in the latest revision of FAA-OR-2783B have been met.

(5) Verify that all functions specified in the Software Product Specification are accomplished by the contractor's software product.

(6) Test the integration of the contractor-enhanced software product with hardware items.

(7) Compare expected with actual/observed performance of the integrated system and identify deficiencies.

b ATM-500/AOS-450 Shakedown Testing. ATM-500 and AOS-450 will jointly conduct operational evaluation and shakedown tests of the hardware and software. This phase of testing verifies that the new hardware and software fulfill the requirements of the contract and system specification and focuses on resolution of critical operational issues. This testing will confirm fulfillment of all specified requirements when the system is run and maintained by operational personnel in an operational environment. ATM-500 and AOS-450 will define the test requirements and develop the test plans and procedures for this test phase. The testing will be conducted by AOS-450 and ATM-500 with assistance and support of the contractor. Satisfactory completion of system shakedown testing will verify readiness to deploy the hardware and software. For new software being developed under the contract, completion of shakedown testing will signify that the software is FAA property and that contractual obligations for performance of software enhancements under the contract have been fulfilled. Operational implementation of the new software at the sites will be the responsibility of ATM-500. The objectives of this testing are as follows:

(1) Evaluate operational performance of the integrated hardware and software.

(2) Verify operational suitability of the hardware and software for delivery to field sites for operational implementation.

(3) Evaluate and recommend changes and tradeoffs to the planned operational configuration.

(4) Predict the operational reliability, maintainability, and availability of the integrated system.

(5) Accumulate logistics consumption data and refine the logistical support of the system.

84 SHAKEDOWN AND CHANGEOVER. Shakedown and changeover is accomplished through the Operational Readiness Demonstration (ORD) on a site-by-site basis. The FAA conducted ORD is a formal demonstration that the integrated hardware and software enhancements are ready to perform real-time flow control

management tasks. It demonstrates the readiness of personnel, procedures, hardware, software and logistics to support these tasks as applicable. The measurement criteria for this demonstration are established by AT, AF, and NAS Development. The contractor will assist the FAA during the ORD phase. An ORD will be performed for each stage of the delivery. The ORD addresses the following operational, maintenance, and engineering areas:

a. Final refinement of operating procedures, methods, adaptation and parameters.

b. Demonstration of the adequacy of all aspects that involve actual flow control management prior to commissioning.

c. Verification that required site logistic support capability has been established, and operational and maintenance documentation are available.

d. Testing of the integrated workstations and software.

85 JOINT ACCEPTANCE INSPECTION. Joint site acceptance inspection and testing will be conducted at each designated site to verify that integrated hardware and software enhancements meet specified functional and operational performance at each site. A Contractor Acceptance Inspection (CAI) and Joint Acceptance Inspection (JAI) shall be held in accordance with Order 6030.45A.

a. Activities. Site acceptance testing will include the following activities:

(1) Site installation and integration testing of hardware by the contractor and AF personnel. The contractor shall verify that delivered equipment is in operational condition and ready for AF testing. The contractor shall assist AF in testing the equipment.

(2) Site installation and testing of software by ATM-500 or their designated representatives.

(3) Site IOC completed by FAA and contractor.

(4) ORD by the FAA assisted by the contractor.

b. Objectives. The objectives of site acceptance testing are to:

(1) Demonstrate, through checkout, that installation is successful and complies with specified requirements at each site.

(2) Verify the performance of integrated hardware and software as adapted to site requirements.

(3) Verify that required support items, such as logistics and support manuals and other documents are available, technically compatible and in compliance with specifications.

(4) Accumulate and provide data to refine the logistics support of the system.

(5) Verify the operational performance of color workstations, MLD devices, and DSP display devices,

(6) Verify the functional and operational performance of the LAN workstations in the ARTCC and TRACON facilities.

(7) Verify the capability of the new color workstations to operate at the site using the operational software baseline.

(8) Verify the operational performance of the interface between departure sequencing equipment located at airport towers and the color workstation located at the controlling ARTCC's.

(9) Verify the operational performance of the interface between MLD's and the Apollo workstations.

86.089. RESERVED.

CHAPTER 9. INTEGRATED LOGISTICS SUPPORT

90 MAINTENANCE CONCEPT. Maintenance of Phase II TMS enhancements applies to procured hardware and software. All equipment was procured off-the-shelf and both system and equipment are expected to meet a standard industry rate of failure. Maintenance goals are to support continuous system operation, with system outages limited to 8 hours per occurrence, and equipment outages to 48 hours per occurrence. A system outage is defined as any failure which results in the loss of the capability to perform any one of the operational requirements. An equipment outage results in a system outage when no alternate equipment is available to backup the failed equipment. The method which will be used to meet these maintenance objectives consists of line replaceable unit (LRU) removal and replacement at the site and faulty component repair off-site. Maintenance responsibilities are shared by the FAA and the contractor as described in the TMS Integrated Logistics Support Plan (ILSP). Maintenance of non-workstation items is the responsibility of the contractor for the first 2 years of the contract, after which it transitions to the FAA Logistics Center. Maintenance of workstation items is provided for under a direct maintenance contract for the life of the workstations. The FAA headquarters is principally responsible for developing and monitoring the maintenance policy, and for budgeting continued maintenance support of project equipment by the FAA Logistics Center.

a. FAA Responsibilities.

(1) Onsite AT personnel are responsible for the following:

(a) Making the initial assessment of the reason for the failure.

(b) Ensuring that the cognizant facility personnel are available to work with maintenance support contractor(s) to diagnose and correct the problem.

(c) Reporting the failure to the ATCSCC, if the failure appears to have been caused by software or by a loss of communication with the ETMS.

(d) Notifying the facility AF technician, if the failure appears to have been caused by hardware or by a loss of communication with the FDIOR.

(2) Onsite AF personnel are responsible for the following:

(a) Ensuring that the cognizant facility personnel are available to work with maintenance support contractor(s) to diagnose and correct the problem.

(b) Isolating the failure to the LRU level if the problem is identified as a hardware discrepancy or a problem with the FDIOU.

(c) Notifying Hewlett Packard/Apollo of the failure if the failed LRU is Apollo workstation equipment.

(d) Maintaining a log of the event.

(e) Contacting the FAA Logistics Center and requesting a replacement, following procedures outlined in Order 4250.9, Field Inventory Management and Replenishment Handbook, if the failed LRU is a device other than Apollo equipment (e.g., an MLD device, a departure sequencing device, a printer, etc.).

(f) Replacing the failed LRU when the new LRU is received.

(g) Returning the failed LRU to FAA Logistics Center for disposition in accordance with the latest version of Order 4250.9, Field Inventroy Management and Replenishment Handbook, and disposing of expendable items in accordance with Order 4800.2A, Utilization and Disposal of Excess and Surplus Personal Property.

(h) AOS-400 is responsible for maintenance of the TMS system as outlined in Order 6110.11, Maintenance of the Traffic Management System, dated November 8, 1991.

(3) ATCSCC is responsible for evaluating' the problem and notifying the appropriate maintenance support contractor who will contact the facility AT personnel.

(4) FAA Logistics Center is responsible for the following:

(a) Managing the repair, alignment, and calibration of equipment and LRU's not covered by the Apollo dedicated maintenance contract.

(b) Support site and depot spares for other than workstation hardware.

(5) Other FAA responsibilities are as follows:

(a) Software maintenance is the responsibility of VNTSC or another dedicated software vendor via ATM-500.

(b) FAA Airway Facilities sectors are responsible for supervising the assignment of maintenance actions to the AF work force, and for coordinating sector maintenance support responsibilities.

b Contractor Responsibilities. The contractor shall be responsible for providing site and depot level maintenance and support for all Apollo items procured and implemented under the contract. Maintenance of all Apollo workstation hardware will be performed through a dedicated maintenance contract with the vendor, managed by the contractor, which will provide both site and depot level maintenance and support.

91 TRAINING. The contractor shall provide training for those individuals and organizations designated by ATM-500. This will include FAA flow management specialists, traffic management coordinators, system administrators, air traffic control specialists, automation specialists, electronic technicians and system engineers. Training will be offered in the operation, administration and maintenance of Apollo workstations, MLD's, departure sequencing equipment, associated software, and Phase II software enhancements. ATM-500 will provide or arrange for ASD and MA Training to TMU personnel. The ASD and MA training materials and documentation will be developed in accordance with FAA-STD-028A, Contract Training Programs, but will be generated under another contract. The FAA Academy will be provided the opportunity to attend contractor field classes and receive contractor developed course materials. The FAA Academy will develop, maintain, and administer an attrition and refresher course for the field sites in both AF and AT areas. The number of courses required will be determined by the FAA Academy at a later time.

a. Operation/Administration Training. Workstation user's training and network administration training for DN580's will be administered by the vendor at the TMU Lab, ARTCC's/TRACON's, and FAA headquarters. The contractor shall provide training in the use of software enhancements, the identification of computer system malfunctions, and the operation of MLD's and departure sequencing equipment.

b Maintenance Training. Maintenance training will be conducted by the contractor at the contractor's training facility. The responsibility of the contractor may include training of ATCSCC personnel in how to maintain software. The Subsystem Training Plan, Traffic Management System will contain training requirements associated with TMS Phase II enhancements.

92 SUPPORT TOOLS AND TEST EQUIPMENT. Support tools and test equipment are not presently called out as requirements in the implementation, testing and support of TMS Phase II enhancements. The contractor shall identify the support tools and test equipment required to support the Apollo workstation dedicated maintenance contract agreement with the vendor.

93 SUPPLY SUPPORT. Supply support of TMS Phase II hardware enhancements will be achieved at the depot level. No onsite maintenance facilities will be required, as only LRU remove and replace actions are planned at the sites. Apollo workstation spares will be supplied by the vendor from their depot. Non-workstation hardware (i.e., MLD's and departure sequencing equipment) spares shall be supplied by the contractor to the FAA Logistics Center which will manage spares distribution. Supply support actions are described in full in the TMS ILSP.

94. VENDOR DATA AND TECHNICAL MANUALS. The contractor shall provide the following vendor data and technical manuals; when possible CDRL item numbers will be correlated with the data and technical documentation. A tracking sytem will be set up to monitor compliance:

a. Vendor Data.

(1) Workstation User's Manuals.

(2) Network Administration Manuals.

(3) Workstation Maintenance Manuals.

b. Technical Documentation.

(1) Software Programmer's Manual.

(2) Computer System Operator's Manual.

(3) Computer System Diagnostics Manual.

(4) Software User's Manual.

(5) System Technical Manual.

95. EQUIPMENT REMOVAL. Removal of existing Apollo DN300 workstations from their current locations was performed by contractor personnel at the ATCSCC and each TMU. Future requirements for equipment removal will be defined on an as needed basis.

96.-99. RESERVED.

APPENDIX 1. ACRONYM LIST/GLOSSARY

ACT	FAA Technical Center
ADR	Automated Demand Resolution
AF	Airway Facilities
AFTN	Aeronautical Fixed Telecommunications Network - AFTN is an FAA telecommunications system that allows communications among all FAA facilities.
AHT	Office of Training and Higher Education
ASU	Office of Acquisition Support
ALTRV	Altitude Reservation - An ALTRV is a reservation for airspace utilization under prescribed conditions normally employed for the mass movement of military aircraft or other special NAS user requirements which cannot otherwise be accomplished.
ANA	Program Director for Automation
ANS	NAS Transition and Implementation Service
ARF	Airport Reservation Function
ARINC	Aeronautical Radio Incorporated - ARINC is an independent corporation that provides high speed data and radio communications services to its subscribers.
ARTCC	Air Route Traffic Control Center - An ARTCC is a facility which provides air traffic control service to aircraft operating on an Instrument Flight Rule (IFR) flight plan within controlled airspace and principally during the en route phase of flight.
ASD	Aircraft Situation Display
ASM	Systems Maintenance Service
ASP	Arrival Sequencing Program
AT	Air Traffic

ATC	Air traffic control. This is a service provided to promote the safe, orderly, and expeditious flow of air traffic.
ATCSCC	Air Traffic Control System Command Center - Located in room 626 of the FAA headquarters, the role of the ATCSCC is to continuously predict, monitor and maintain command and control of the day to day NAS en route and terminal facility demand, capacity and delays in the 48 contiguous states at a national level.
ATCT	Airport Traffic Control Tower
CARF	Central Altitude Reservation Facility
CCB	Configuration Control Board
CCD	Configuration Control Decision
CDRL	Contract Data Requirements List
CDT	Controlled Departure Time - CDT's are the times computed for individual aircraft to be cleared for departure. CDT's are used as a means to spread the demand for a particular NAS resource over a longer time period in order to alleviate a condition where demand is predicted to be significantly in excess of capacity. The CDT's will be sent 'to each ARTCC based on the simulations run by the ATCSCC.
CFCC	Central Flow Control Computer - The CFCC is the principal hardware and software element for the ATCSCC. It manages the ATCSCC data base, provides data base updates, and provides the simulations of future demand at pacing airports.
CFCF	Central Flow Control Facility - The CFCF is responsible for flow control management of the National Airspace System and Traffic Management System.
CLIN	Contract Line Item Number
CM	Configuration Management
co	Contracting Officer
COTR	Contracting Officer's Technical Representative

CPU	Central Processing Unit - The functional part of a computer which performs the actual arithmetic and logic manipulations upon data.
CSCI	Computer Software Configuration Item - The software code and associated documentation.
DAC	Days After Contract Award .
DCT	Departure Coordination Tool
DFM	Departure Flow Management (program)
DRR	Deployment Readiness Review
DSP	Departure Sequencing Program
DSS	Data Systems Staff - The DSS consists of ATM personnel assigned to maintain TMS operational software.
EOF	Emergency Operations Facility - A secondary location intended to supplant the ATCSCC during emergency or disaster situations during which the primary facility at the FAA headquarters would not be available. During situations such as riots, picketing, floods, or any other situation precluding operations from the ATCSCC, central flow control functions would be performed at the EOF.
ERM	En Route Metering (Project)
ESP	En Route Spacing Program
ETMCC	Enhanced Traffic Management Computer Complex
ETMS	Enhanced Traffic Management System
FAA	Federal Aviation Administration
FCA	Functional Configuration Audit
FDICN	Full Duplex Interim Communications Network
GFP	Government Furnished Property
GPO	General Purpose Output
HWCI	Hardware Configuration Item .

ICD	Interface Control Document
IFCN	Interfacility Flow Control Network - The main processor for the IFCN is located in the traffic management computer complex at the FAA Technical Center. This system provides a two-way communications link between the CFCC, ATCSCC, and the 21 traffic management unit's, In addition, the processing system interfaces with the Aeronautical Radio Incorporated, Aeronautical Fixed Telecommunications Network, and National Data Interchange Network circuits for flight plan updates from airlines and flight service stations.
IOC	Initial Operational Capability
ILSP	Integrated Logistics Support Plan
ISP	Integrated Support Plan
JAI	Joint Acceptance Inspection
LAN	Local Area Network - A communications network composed of a series of stations connected by a transmission medium with a high data transmission rate covering a geographic area less than 10 miles.
LRU	Line Replaceable Unit
MA	Monitor Alert
MDFM	Material Delivery Forecast Module
MLD	Metering List Display
NADIN	National Data Interchange Network
NAILS	National Airspace Integrated Logistics Support
NAS	National Airspace System
NAS En Route Stage-A	The central processing system at each ARTCC comprised of hardware and software. The Host computer is the hardware element of the NAS En Route Stage-A.
NTMO	National Traffic Management Officer
ORD	Operational Readiness Demonstration

PCA	Physical Configuration Audit
PDSR	Program Director Status Review
PIP	Project Implementation Plan
PVD	Plan View Display
RAM	Random Access Memory
SEI	System Engineering and Integration
SEU	Serial Expansion Unit
TBD	To Be Determined
TMCC	Traffic Management Computer Complex - The TMCC is located at the FAA Technical Center and is the operations area for the CFCC and IFCN.
TMS	Traffic Management System consists of the people, facilities, hardware and software which manage the air traffic control process used to make maximum use of the NAS in the most efficient and safe manner. The air traffic control systems command center, traffic management unit's, airport reservations offices, and the central altitude reservation function are the operational units which perform the TMS functions.
TMS P2E	Traffic Management Systems Phase II Enhancements
TMU	Traffic Management Unit - Located at the 20 air route traffic control centers in the contiguous United States and selected terminal facilities. The traffic management units are comprised of the people, facilities, hardware and software which manage local traffic flow.
TOR	Technical Onsite Representative will be appointed by the Region, and will have overall responsibility for implementation management of the TMS Project within the ARTCC.
TRACON	Terminal Radar Approach Control
UPS	Uninterrupted Power Supply

APPENDIX 2. EQUIPMENT SPECIFICATIONS

1. DN580 Workstation Specifications

a. Central Processing Unit (CPU).

(1) Dimensions. Width: 13.5 inches, Depth: 28.5 inches, Height: 24.5 inches

(2) Weight. 125 pounds

(3) Heat Dissipation. 4270 BTU per hour

(4) Voltage. Dedicated 100-120V, 16 AMP

(5) Power Requirement. 1250 Watts

(6) AC Power Cords. One 8.0 foot (NYMA 5-20P)

b. Color Monitor (Sony 19 inch).

(1) Dimensions. Width: 19.2 inches, Depth: 22.5 inches, Height: 19.2 inches

(2) Weight. 97 pounds

(3) Heat Dissipation. 751 BTU per hour

(4) Voltage. 90-130 Vac

(5) Power Requirement. 220 Watts

(6) AC Power Cords. One 6.5 foot (NYMA 5-15P)

(7) Cabling Provided. One 6.5 foot coaxial video cable provided to connect monitor to CPU. An optional 25 foot coaxial video cable to allow flexibility in placement of the CPU.

c. Keyboard

(1) Dimensions. Width: 20.7 inches, Depth: 7 inches, Height: 1.4 inches

(2) Weight. 4 pounds

(3) Heat Dissipation. Not applicable.

(4) Voltage. 5 Volts +/- 5 percent DC

(5) Power Requirement. 2 Watts maximum

2. DN4500 Fileserver Specifications

a. Central Processing Unit (CPU)

(1) Dimensions. Width: 20.9 inches, Depth: 17.2 inches, Height: 6.7 inches

(3) Weight. 47 pounds

(4) Heat Dissipation. 1200 BTU per hour

(5) Voltage. 120-240V AC switch selectable

(6) Power Requirement. 350 Watts

(7) AC Power Cords. One 8.0 foot (NYMA 5-20P)

b. Color Monitor (Panasonic 19 inch)

(1) Dimensions. Width: 19 inches, Depth: 19.3 inches, Height: 18.7 inches

(2) Weight. 61.6 pounds

(3) Heat Dissipation. 683 BTU per hour

(4) Voltage. 115V (+/- 10 percent) AC, 2 Amp Maximum

(5) Power Requirement. 150 Watts

(6) AC Power Cords. One 6.5 foot (NYMA 5-15P)

c. Monochrome Monitor (Phillips 19 inch)

(1) Dimensions. Width: 18.2 inches, Depth: 15.4 inches, Height: 18.3 inches

(2) Weight. 49.5 pounds

(3) Heat Dissipation. 290 BTU per hour

(3) Voltage. Switchable 100-240V

(4) Power Requirement 85 Watts

d. Low Profile Keyboard

(1) Dimensions. Width: 20.7 inches, Depth: 7 inches, Height: 1.4 inches

(2) Weight. 4 pounds

(3) Voltage. 5V +/- 5 percent, 400mA DC

(4) Power Requirement. 2 Watts

e. NEC P565XL Pinwriter Specifications

(1) Dimensions. Width: 22.8 inches, Depth: 14.7 inches, Height: 6.1 inches

(2) Weight. 37.4 pounds

(3) Heat Dissipation. Not Applicable

(4) Voltage. 115 Vac +/- 15 percent

(5) Power Requirement. 460 Watts Maximum

(6) AC Power Cords. One 8.0 foot (NEMA 5-15P)

3. APOLLO DN300 Workstation Specifications

a. CPU/Monitor Integrated Unit

(1) Dimensions. Width: 22.5 inches, Depth: 16.5 inches, Height: 18.4 inches

(2) Weight. 87.4 pounds

(3) Heat Dissipation. 1110 BTU per hour

(4) Voltage. 115 Vac +/- 15 percent

(5) Power Requirement. 420 Watts

(6) AC Power Cords. One 8.0 foot (NEMA 5-15P)

b. Disk Drive

(1) Dimensions. Width: 12.8 inches, Depth: 19.1 inches, Height: 12.8 inches

(2) Weight. 53.0 pounds

(3) Heat Dissipation. 700 BTU per hour

(4) Voltage. 120 Vac

(5) Power Requirement. 230 Watts

c. Keyboard

(1) Dimensions. Width: 22.5 inches, Depth: 7.4 inches, Height: 1.2 inches

(2) Weight. 4.8 pounds

(3) Voltage. 5 Volts +/- 5 percent DC

(4) Power Requirement. 2 Watts maximum

d. DANFORD SEU-1600 Serial Expansion Unit

(1) Dimensions. Width: 21 inches, Depth: 10 inches, Height: 11 inches

(2) Weight. 15 pounds

(3) Heat Dissipation. 93.8 BTU per hour

(4) Voltage. 5 Volts +/- 5 percent at 5.5A Nominal

(5) Power Requirement. 27.5 Watts

e. DYNATECH Switch Specifications

(1) Dimensions. Width: 19 inches, Depth: 14 inches, Height: 7 inches

(2) Weight. 22 pounds

(3) Heat Dissipation. 85 BTU per hour

(4) Voltage. 115 Vac (+/- 10 percent)

(5) Power Requirement. 25 Watts

APPENDIX 3. PLANS AND REPORTS REQUIRED FOR IMPLEMENTATION

1. Successful implementation of the hardware and software described in this order will require the preparation and approval of the following documents. Each site will receive a site survey (CDRL Item T045), Installation Plan (CDRL Item T044), and Test Procedures (CDRL Item T042) prior to installation. Two weeks after the installation is completed, the site will receive test reports (CDRL Item T043).

a. Contractor Documentation.

(1) Software Product Specification (CDRL Item T014).

(2) Version Description Document (CDRL Item T024).

(3) Integrated Support Plan (CDRL Item T030).

(4) Maintenance Plan (CDRL Item T033).

(5) Computer Software Quality Program Plan (CDRL Item T040).

(6) Master Test Plan (CDRL Item T041).

(7) Test Procedures (CDRL Item T042).

(8) Test Reports (CDRL Item T043).

(9) Installation Plan (CDRL Item T044).

(10) Site Survey Report (CDRL Item T045).

(11) Master Training Plan (CDRL Item T046).

(12) CM Plan (CDRL Item T021).

(13) Software Test Description (CDRL Item T016).

(14) Software Test Procedures (CDRL Item T017).

(15) Software Test Report (CDRL Item T018).

(16) System Fault Isolation (CDRL Item T051).

(17) Training Documentation (CDRL Item T055).

b. FAA Documentation.

(1) TMS Master Test Plan,

(2) FAA Technical Center TMS Workstation Integration Test Plan.

(3) ASM-450/ATO-120 Shakedown Test Plan.

(4) ATO Plan for Operational Software Releases.

(5) TMS Subsystem Training Plan.

APPENDIX 4. DOCUMENT REFERENCE LIST

1 The following documents, referred to in the body of this order, provide information, policy, and directives applicable to this implementation.

a. FAA-E-2777-A, Segment Specification Traffic Management System Automation Enhancement Phase II.

b. FAA-OR-2783-B, System Description: Traffic Management System Phase II Enhancements.

c. Order 1800.8F, National Airspace System Configuration Management.

d Order 1800.63A, National Airspace System Deployment Readiness Review Program.

e. Order 1810.4B, NAS Test and Evaluation Program.

f Order 4800.2A, Utilization and Disposal of Excess and Surplus Personal Property.

g Order 6000.30B, Policy for Maintenance of the NAS Through the Year 2000.

h Order 6110.11, Maintenance of the Traffic Management System:

h! Order 6030.45, Facility Data Reference File.

i. Order 6560.25, Project Implementation Plan for the Meteorologist Weather Processor.

j Order 6650.9, Requirements for Area Control Facility Under the Floor Cabling.

k! FAA-STD-028, Contract Training Programs.

1! DOD-STD-2167A, Defense System Software Development.

m. MIL-STD-1521B, Technical Reviews and Audits.

n. TMS Integrated Logistics Support Plan.

o. NAS Project Status and Baseline Schedule Change Control Procedures.

p. TMS Workstation and NAS Stage A En Route Central Computer Complex Interface Control Document.

q. NAS-MD-880, Interface Control Document (ICD), Traffic Management Workstation (TMW) Facility - NAS Stage A En Route Host Computer System (HSC).

r. NAS-MD-110, ADL Test and Evaluation (T&E) Terms and Definitions for the NAS.

APPENDIX 5. DELIVERY AND INSTALLATION SCHEDULE

1. STAGE-1 DELIVERIES (COMPLETED). The contractor delivered color display workstations and associated equipment, and installed and integrated the DN300 workstation according to the following sequence in FY 1989.

SITE
FAA Technical Center
Washington HQ ATM-500
Washington ARTCC
Los Angeles ARTCC
New York ARTCC
New York TRACON
Fort Worth ARTCC
Indianapolis ARTCC
Atlanta ARTCC
Cleveland ARTCC
Jacksonville ARTCC
Kansas City ARTCC
Chicago ARTCC
Boston ARTCC
Seattle ARTCC
Salt Lake City ARTCC
Memphis ARTCC
Oakland ARTCC
Houston ARTCC
Miami ARTCC
Minneapolis ARTCC
Albuquerque ARTCC
Denver ARTCC

2 STAGE-2 DELIVERIES (COMPLETED). The contractor delivered and installed workstations and associated equipment according to the following sequence in FY 1990.

SITE
FAA Academy
FAA Technical Center
Washington ARTCC
Los Angeles ARTCC
New York ARTCC
Philadelphia TRACON
Fort Worth ARTCC
Indianapolis ARTCC
Atlanta ARTCC
Cleveland ARTCC

Jacksonville ARTCC
Kansas City ARTCC
Chicago ARTCC
Chicago TRACON
New York TRACON
Boston ARTCC
Seattle ARTCC
Salt Lake City ARTCC
Memphis ARTCC
Oakland ARTCC
Houston ARTCC
Miami ARTCC
Minneapolis ARTCC
Albuquerque ARTCC
Denver ARTCC

NOTE 1. ASD 4.1 was delivered in FY 1991.
NOTE 2. ASD 4.2 is scheduled to be delivered in FY 1992.
NOTE 3. ASD 5.0 is scheduled to be delivered in FY 1993.
NOTE 4. Detailed schedules of software deliveries are defined in the Material Delivery Forecast Module (MDFM).
NOTE 5. Anchorage ARTCC and FAA Academy was delivered in FY 1991.

3 STAGE-3 TRACON DELIVERIES. The contractor will deliver and install the workstation hardware and software to the following sites as specified in the MDFM.

ID	SITE
ATL	Atlanta
BAL	Baltimore
A90	Boston
CLT	Charlotte
C90	Chicago
D10	Dallas-Fort Worth
D84	Denver
D21	Detroit
IAH	Houston
LAS	Las Vegas
L56	Los Angeles
MEM	Memphis
MIA	Miami
M98	Minneapolis
N90	New York TRACON
090	Oakland TRACON
MCO	Orlando
PHL	Philadelphia

PIT	Pittsburgh
P50	Phoenix TRACON
RDU	Raleigh/Durham
S46	Seattle-Tacoma
T75	St Louis
IAD	Washington D.C.
DCA	Washington D.C.

NOTE 1. Workstation and fileserver equipment will be purchased by the TMS program office for Southern California TRACON (SCT). The procurement and installation will be funded by the SCT project.

4. STAGE-3 ARTCC DELIVERIES. The contractor will deliver and install MLD hardware and software to the following sites as specified in the MDFM.

ID	SITE
ZTL	Atlanta
ZAB	Albuquerque
ZBW	Boston
ZAU	Chicago
ZOB	Cleveland
ZDV	Denver
ACYT	FAA Technical Center
ZFW	Fort Worth
ZHU	Houston
ZID	Indianapolis
ZJX	Jacksonville
ZKC	Kansas City
ZLA	Los Angeles
ZMA	Miami
ZME	Memphis
ZMP	Minneapolis
ZNY	New York
ZOA	Oakland
ZLC	Salt Lake City
ZSE	Seattle
ZDC	Washington D.C.

5. STAGE-4 ARTCC DELIVERIES. The contractor will deliver and install the DSP hardware and software to the following sites as specified in the MDFM.

ID	SITE
ZTL	Atlanta
ZAB	Albuquerque

ZBW	Boston
ZAU	Chicago
ZOB	Cleveland
ZDV	Denver
ACYT	FAA Technical Center
ZFW	Fort Worth
ZHU	Houston
ZID	Indianapolis
ZJX	Jacksonville
ZKC	Kansas City
ZLA	Los Angeles
ZMA	Miami
ZME	Memphis
ZMP	Minneapolis
ZNY	New York
ZOA	Oakland
ZLC	Salt Lake City
ZSE	Seattle
ZDC	Washington D.C.

6. STAGE-4 ATCT DELIVERIES. The contractor will deliver and install DSP ATCT hardware and software to the following sites as specified in the MDFM.

ID	SITE
ATL	Atlanta
FTY	Atlanta
PDK	Atlanta
BWI	Baltimore
BOS	Boston
BUF	Buffalo
BUR	Burbank
ADW	Andrews AFB
CLT	Charlotte
ORD	Chicago
MDW	Chicago
CLE	Cleveland
COS	Colorado Springs
CVG	Covington/Cincinnati
ADS	Dallas
DAL	Dallas
DFW	Dallas-Ft Worth
RBD	Dallas
DEN	Denver
DTW	Detroit
ACYT	FAA Technical Center
FMH	Falmouth
FLL	Fort Lauderdale

FTW	Fort Worth
HOU	Houston
IAH	Houston
ISP	Islip
MCI	Kansas City
MKC	Kansas City
LAS	Las Vegas
LIT	Little Rock
LGB	Long Beach
LAX	Los Angeles
MEM	Memphis
MIA	Miami
MKE	Milwaukee
MSP	Minneapolis
BNA	Nashville
JFK	New York
LGA	New York
EWR	Newark
MSY	New Orleans
OAK	Oakland
ONT	Ontario
PHL	Philadelphia
PHX	Phoenix
PIT	Pittsburgh
PDX	Portland
RDU	Raleigh/Durham
RFD	Rockford
SMF	Sacramento
SRQ	Sarasota/Bradenton
SLC	Salt Lake City
SAN	San Diego
SFO	San Francisco
SJC	San Jose
SNA	Santa Ana
SEA	Seattle
S46	Seattle
STL	St Louis
PIE	St Petersburg/Clearwater
TPA	Tampa
TEB	Teterboro
VNY	Van Nuys
IAD	Washington D.C.
DCA	Washington D.C.
PBI	West Palm Beach
HPN	White Plains
ICT	Wichita
BDL	Windsor Locks

APPENDIX 6. DEPLOYMENT READINESS REVIEW ACTIVITIES

1. Deployment Readiness Review Activities.

   a. DRR Team Meeting.

   b. Baseline DRR Checklist.

   c. Monthly Checklist Reviews,

   d. Successful Completion of OT&E/Shakedown Testing.

   e. DRR Report.

   f. DRR EXCOM Meeting.

   g. Deployment Decision.

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